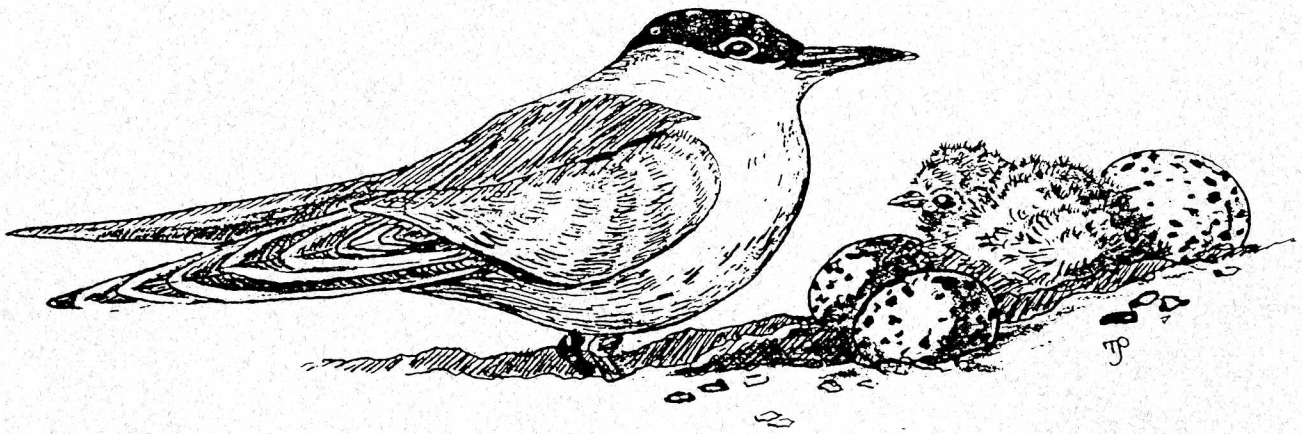
Conservation Action Plan for the Avian Communities in the Virginia Barrier Islands System



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Barrier Island Avian Partnership

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The Nature Conservancy®

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CONSERVATION ACTION PLAN
FOR THE
AVIAN COMMUNITIES IN THE
VIRGINIA BARRIER ISLANDS SYSTEM

INTRODUCTION

The Virginia barrier islands system has long been renowned for hosting large numbers of nesting, migrating and wintering colonial waterbirds, waterfowl, shorebirds, raptors, and songbirds. Recognition of this area's unique role in providing critical habitat has motivated several entities, including the U.S. Fish and Wildlife Service, the Virginia Department of Game and Inland Fisheries, the Virginia Department of Conservation and Recreation, the Virginia Marine Resources Commission, and The Nature Conservancy to secure portions of the landscape for enhanced protection. Although these efforts have gone a long way toward protecting this important natural resource, many threats place the avian communities in jeopardy. Threats include habitat loss and degradation, severe weather events, competition, predation, disease, contamination, disturbance, and water quality decline.

This document represents the development and first steps toward implementation of a **Conservation Action Plan** for the avian communities in the Virginia barrier island system and combines the respective efforts of interested organizations and agencies, researchers, the community, and others active in this area who believe that an action plan is essential for most effectively addressing threats to these avian communities. It contains important information on the status and trends of the avian communities in the barrier island system and on the threats to these avian resources. It offers a menu of recommendations for potential actions in management, research and monitoring, and education that have been evaluated in terms of priority, feasibility, costs, partnerships, and measurability. **The goal of the Conservation Action Plan will be to ensure the long-term viability of the avian communities, species, and habitats in the Virginia barrier islands system through a partnership approach.**

The development of this Conservation Action Plan was initiated by first convening the **Barrier Island Avian Partnership,** a team of regional experts and representatives from the different management partners (See Appendix I - Avian Partnership). These scientific and management professionals met twice for a total of four days to lay the foundation for the Conservation Action Plan, including identification of priority avian species; prioritization of threats to the area and to the avian communities; and the development of recommendations for potential actions involving management, research and monitoring, and education. After these meetings, the Partnership team produced a draft Conservation Action Plan. More meetings were then held to further develop priorities and strategies for implementation and to identify lead partners for a final set of conservation actions.

The Partnership team intends to use this document as guidance for respective and cooperative management, research and monitoring, and education actions. Informal and formal agreements among the managing agencies and organizations will be pursued, as well as the adoption of these agreements by the larger community of people who live in and visit the area.

BACKGROUND

The Virginia barrier islands system, which includes the barrier islands, the coastal bays and salt marshes, and the mainland and associated marshes, has experienced far less human disturbance than any other barrier island-salt marsh system on the Atlantic coast. Salt, brackish, and fresh marshes, overwashes, beaches, dune grasslands, maritime thickets, and maritime forest provide important habitat for a number of different avian species during various times of the year. The dynamic nature of the area makes it a unique and flourishing habitat for the many avian species that are found here, but also makes them much more subject to disturbances, both natural and human in origin.

Many of the avian species that nest, migrate and winter in the Virginia barrier islands system were nearly extirpated at the turn of the century by market hunters, plume hunters, and local residents living in watch houses on the salt marshes and on the barrier islands. After protection efforts were initiated in the early twentieth century, the populations of most species utilizing the barrier islands system rebounded (Austin, 1932).

The large concentration of birds utilizing the barrier islands system have led to numerous protection efforts in the past, primarily the establishment of refuges by federal, state, and private conservation groups. The U.S. Fish & Wildlife Service (USFWS) has established the Chincoteague National Wildlife Refuge (NWR) and recently added components at Cedar, Metompkin, Wallops and Assawoman Islands in Accomack County. In addition, the USFWS has established the Eastern Shore of Virginia and Fisherman Island NWRs in Northampton County. The Virginia Department of Conservation and Recreation manages Wreck & Bone Island Natural Area and Kiptopeke State Park, and The Virginia Department of Game and Inland Fisheries manages Mockhorn Island Wildlife Management Area. The Nature Conservancy has established and manages the Virginia Coast Reserve, a preserve of fourteen islands. In addition, most of the marshes and meadowlands on the seaside of Virginia's Eastern Shore are owned by the State of Virginia and managed by the Virginia Marine Resources Commission (VMRC).

These combined efforts have resulted in the protection of nearly all of the core landscape of the Virginia barrier islands system. The ecological significance of Virginia barrier islands system has been recognized by the United Nations through its designation as a "Man and the Biosphere Reserve" and by the Western Hemisphere Shorebird Reserve Network through its designation as an "International Shorebird Reserve." The Nature Conservancy also has designated the Virginia Coast Reserve as one of its "Last Great Places - An Alliance for People and the Environment" whose goal is saving this outstanding ecosystem in ways that recognize the needs of both people and nature.

Although these efforts have gone a long way toward protecting the resources of the Virginia Barrier Island System, many species are in decline and new pressures threaten the viability of this habitat and the birds. Declining species include Common Terns, Least Terns, Gull-billed Terns, Black Skimmers, Black Ducks, migrant Canada Geese and several herons (Williams et al, 1993)

(Costanzo, personal communication). Other currently protected species such as the Piping Plover and Wilson's Plover continue to be found within the system. Potential threats to all of these species include degradation and loss of habitat, severe weather events (storms and flooding), competition and displacement from nesting habitat by aggressive avian species, mammalian and avian predators (raccoon, Norway Rat, Red Fox, gulls, and Fish Crows), and disturbance from increased recreational use of barrier islands and salt marsh habitats. It is expected that public use of the islands, beaches, and marshes during all seasons will increase in the near future and that an expanded ecotourism industry will develop in the area, possibly placing increased pressure at critical times of the year.

A Conservation Action Plan governing either the formal or informal coordination of agencies' and organizations' management, research and monitoring, and educational activities will be essential for reducing the impacts of these threats and conserving the avian communities of the barrier islands system. The Action Plan will document and address threats to these avian resources across the regional landscape through a coordinated approach among the refuge owners or "partners," i.e., USFWS, The Nature Conservancy, the Virginia Department of Game and Inland Fisheries, the Virginia Department of Conservation and Recreation, and the Virginia Marine Resources Commission. The Partnership team recommends that an informal partnership approach be continued for implementation of the Conservation Action Plan while formal adoption by relevent agencies and organizations is pursued. Further, a Conservation Action Plan adopted by those with other interests in the area, including residents, island users, scientists and visitors is critical for more comprehensive protection of this resource. Because of coastal processes, social interactions, the dynamic nature of the avian community and other ecological factors, a regional approach is essential. The Partnership team also recognizes that the Action Plan should be a "living" document with the plan considered a "beginning" to the coordinated implementation of different strategies for conservation action.

GOALS OF THE CONSERVATION ACTION PLAN

The Barrier Island Avian Partnership, comprised of landowners, agencies and scientific professionals who work in the area, identified the following as the primary goal for the Conservation Action Plan:

> *To ensure the long-term viability of the avian communities, species, and habitats in the Virginia barrier islands system through a partnership approach.*

This goal should help promote cooperation and coordination among the many entities that are concerned about the avian communities, taking into account the unique mission of each of the groups and agencies and their respective management plans. This Conservation Action Plan combines individual efforts into a comprehensive approach outlined in this umbrella plan. In general, the recommendations for conservation actions should be specific, achievable, and measurable. Meeting the goal of the long-term viability of the avian communities, species, and

habitats involves the following:

* Prioritization of key species and critical habitat.
* Prioritization of threats to the avian community.
* Prioritization of recommendations for strategies for conservation actions in management, research and monitoring, and education.
* Coordination of data collection, monitoring and access; resources; and management and educational activities.

In order to develop the priorities necessary to focus the Conservation Action Plan, criteria were determined for focusing efforts on actions that will benefit the species of greatest concern, and actions which are feasible, cost effective, measurable, have catalytic effects and foster partnerships. Fostering partnerships include coordination and exchange of data. To encourage broader partnerships, beyond those whose professional lives revolve around the barrier islands system, the Partnership team recognizes the necessity of broadening the awareness and involvement of members of the Eastern Shore community. The Partnership also recognizes that measures of success are important for evaluating the success of the Conservation Action Plan. Finally, a plan for exposure of the Conservation Action Plan is necessary to inform people interested in the Virginia barrier islands system that such a coordinated effort exists, and to assist in securing support and funding for implementation of the Conservation Action Plan.

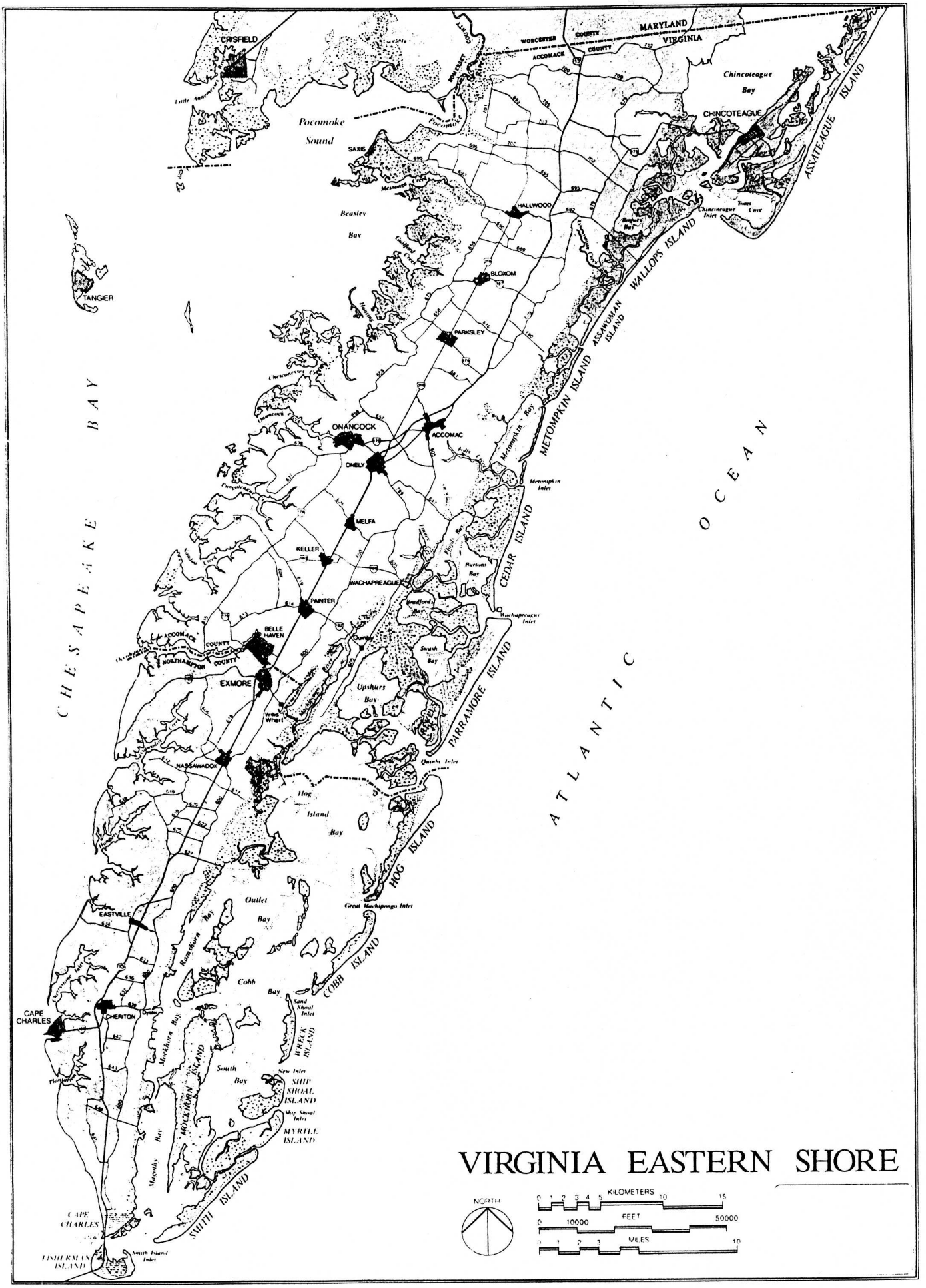
SCOPE OF THE CONSERVATION ACTION PLAN

The Conservation Action Plan includes two components: (1) avian communities and species, and (2) landscape and habitats. (See map of the area, page 5a).

The "avian communities of the Virginia barrier island system" includes nesting, migrating and wintering:

- Colonial and Beach-Nesting Waterbirds and Waders (e.g., skimmers, terns, gulls, pelicans, ibis, heron, egrets)
- Shorebirds (e.g., plovers, willets, oystercatchers)
- Waterfowl (e.g., American Black Ducks, Mallards, Canada Geese)
- Raptors (e.g., Peregrine Falcon, owls, osprey, eagles)
- Marsh Birds (e.g., rails, bitterns)
- Songbirds (e.g., nuthatches, warblers, sparrows)
- Marine Birds (e.g., sea ducks, loons, petrels, gannets)

The landscape encompassed in this Action Plan is the Virginia barrier islands system, including the mainland of the Eastern Shore and beyond to the extent that it is used by birds of concern.


VIRGINIA EASTERN SHORE
CRISFIELD
MARYLAND
VIRGINIA
WORCESTER COUNTY
ACCOMACK COUNTY
Pocomoke Sound
SAXIS
HALLWOOD
BLOXOM
PARKSLEY
TANGIER
Chincoteague Bay
CHINCOTEAGUE
ASSATEAGUE ISLAND
WALLOPS ISLAND
ASSAWOMAN ISLAND
METOMPKIN ISLAND
CHESAPEAKE BAY
ATLANTIC OCEAN
ONANCOCK
ACCOMAC
ONELY
MELFA
KELLER
MACHIPREAGUE
PAINTER
CEDAR ISLAND
BELLE HAVEN
ACCOMACK COUNTY
NORTHAMPTON COUNTY
EXMORE
PARRAMORE ISLAND
NASSAWADOX
Hog Island Bay
HOG ISLAND
EASTVILLE
Outlet Bay
Cobb Bay
COBB ISLAND
CAPE CHARLES
CHERITON
WRECK ISLAND
SHIP SHOAL ISLAND
MYRTLE ISLAND
SMITH ISLAND
FISHERMAN ISLAND
NORTH
KILOMETERS
FEET
MILES

STATUS AND TRENDS OF THE AVIAN COMMUNITIES

Colonial Waterbirds

Colonial waterbirds account for the greatest diversity of breeding avifauna in the barrier islands region. In 1993, 63,000 pairs of 23 species (about 3/4 of the total population nesting in the coastal plain of Virginia) nested in the barrier islands system (Watts et al. 1994). In the past 15 years, three species have colonized (as breeders) the Virginia barrier islands region - White Ibis, Eastern Brown Pelican, and Double-crested Cormorant. No species have gone extinct in the region. Species of highest research and monitoring priority are listed in Table 1 on page 9. Species that have shown significant declines in the last 20 years include Common and Gull-billed Terns, Black Skimmers, Black-crowned Night-Herons, Tricolored and Little Blue Herons (Williams et al. 1990, Va. J. Sci. 41).

During migration and winter, most species move from the barrier region southward. Major overwintering species include Herring and Great Black-backed Gulls and large numbers of the more northern Ring-billed Gulls. Numbers of some gull species in winter may exceed those in summer. Great Blue Herons and Great Egrets winter in the region in most winters. Their numbers are greater in the Chesapeake Bay region, however, than along the barrier islands. Also, Double-crested Cormorants are present year-round in large numbers in the region.

Shorebirds

Shorebird numbers may exceed several hundred thousand during spring and fall migration along the islands and bays, and the region has received "International" status as a Western Hemisphere Shorebird Reserve Network site under the Wetlands for the Americas Program. The largest concentrations are along the island beaches and inlets and on scattered mudflats in the various coastal bays along the seaside. Concerns for significant declines of Short-billed Dowitchers, Least and Semipalmated Sandpipers (and possible declines of Red Knots and Black-bellied Plovers) have been raised along the eastern Atlantic (Howe et al. 1989 Biol. Conserv. 49; Morrison et al. 1994 Wilson Bull. 106), based on analyses of International (or Maritime) Shorebird Survey data. The Maritime data (Morrison et al. 1994), which included more recent (up to 1991) data than did the ISS data (Howe et al. 1989), indicated that drastic declines for sanderlings and whimbrels may not have been well- founded.

Only six species of shorebirds nest in the barrier region: Piping and Wilson's plovers, American Oystercatchers, Killdeers, the eastern race of the Willet, and American Woodcock. Plover numbers have been reasonably stable in recent years with a high degree of management focus. High priority has been given the plovers (see Table 1) because of earlier declines and threats to their populations. Woodcock are not abundant breeders in the region. During winter, American Woodcock are present in large numbers in the southern part of the peninsula, mostly on mainland fields and in bottomlands; this area may be one of the "hotspots" in the region for them. Their numbers have declined in the eastern U.S. over the past decade (USFWS unpubl. reports). Other

species wintering in significant numbers (several thousand) are sanderlings and dunlin.

Waterfowl

Species of waterfowl that breed in the barrier region include American Black Ducks, Mallards, resident Canada Geese, the exotic Mute Swan, Wood Ducks, and a few Gadwalls and Blue-winged Teal. Black Duck numbers have declined in eastern Virginia since the 1960s, while Mallards, Mute Swans, and resident geese have increased substantially. Concerns have been raised that game-farm released Mallards may be genetically "swamping" the native Black Ducks.

During fall migration and winter, aerial surveys find over 80,000 geese and ducks in the barrier islands region on any given day. These numbers include about 80 percent of the Black Ducks and 95 percent of the Atlantic Brant in Virginia that winter in the barrier region. However, numbers of American Black Ducks and migrant Canada Geese have declined rather markedly such that severe hunting restrictions have been enacted. Concerns over declining Black Ducks have led to the formation of a Black Duck Joint Venture, under the North American Waterfowl Management Plan. The effort pushes for cooperative private-state-federal partnerships in protecting habitats both for breeding and wintering Black Ducks.

Numbers of migrant Canada Geese have declined on the Delmarva Peninsula from almost one million in the mid-1970's down to about 300,000 in the mid-1990's. Snow Geese numbers have increased along the mid-Atlantic coast. Concern over destruction of saltmarsh has not been a major issue in the Virginia barrier islands region as it has in Delaware and New Jersey where Snow Goose populations are much larger.

Large wintering populations of bay ducks are found in the bays and oceans in the barrier islands region, but little substantive data are available on trends.

Marine birds

Data on marine birds are quite limited since no systematic surveys are conducted for any marine species. The Common Loon has been a species of widespread concern throughout North America; this species winters in some numbers off the barrier islands. Gannets move into the region in October and may winter in large numbers in the area, as do many sea ducks. Other species such as Wilson's Storm-Petrels and occasional shearwaters are seen in summer on a regular basis but no systematic pelagic survey data are available.

Marsh birds

One of the most common marsh species, the Clapper Rail, nests in abundance throughout the Virginia barrier islands. Its numbers appear to be reasonably stable. Other rails, present primarily during migration, include Virginia, Sora, King, Yellow, and Black Rails. There are no annual surveys conducted to collect population data on these species. Rails are short-distance, late-fall migrants and some may winter in Virginia.

Raptors

A number of species of raptors breed in the region, some of which have exhibited dramatic population recoveries since the banning of DDT in the 1970s; these include Southern Bald Eagles, Ospreys, and Peregrine Falcons. An active recovery program for falcons in the barrier region has been underway for about 20 years. Large numbers of other raptors, including Great Horned Owls, Red-tailed and Red-shouldered Hawks, Northern Harriers, and American Kestrels, also breed in the barrier region.

During migration, the southern tip of the DelMarVa peninsula forms a geographic bottleneck. As a result, large numbers of migrating accipiters (Sharp-shinned and Cooper's Hawks), falcons (Peregrines, Merlins, and Kestrels), and buteos (Red-tailed, Red-shouldered, and Broad-winged Hawks) move through the region, many using the barrier islands and marshes. During migration and in winter, declines are suspected for Northern Harriers and Saw-whet Owls, species that are high priorities (Table 1).

Songbirds

Many species of songbirds nest on the barrier islands and along the mainland of the Virginia barriers. Limited data for the region indicate that Brown-headed Nuthatches, Sedge Wrens, and possibly Eastern Meadowlarks are showing some population declines: . The Sedge Wren is the only regional songbird on the State's Endangered Species list (Terwilliger 1991, Virginia's Endangered Species, McDonald and Woodward Publ. Co.). The barrier islands are a stronghold for a few breeding species such as Horned Larks and Yellow Warblers.

During migration, the Cape Charles region is at least as important as Cape May, New Jersey as a "funnel" for migrating songbirds (Watts and Mabey 1994). Along the barrier islands, large numbers of Yellow-rumped Warblers and other warblers feed on wax myrtle berries and other fruits, sharing them with Gray Catbirds, Tree Swallows, Yellow-rumped Warblers and many other species. During winter, smaller numbers of songbird species remain in the region.

Table 1. List of priority bird species for the Virginia barrier island region.

[a] Status: NA - no special state or federal status; F-E - federally endangered; F-T - federally threatened; F-O - On Office of Migratory Bird Management's 1995 List of Species of Management Concern; S-SC - State list of Special Concern (Terwilliger 1991); S-T - State threatened; S-E - State endangered. Not all species listed in Terwilliger (1991) as "special concern" are listed above, only those with noted changes in populations.

[b] Trend: For colonial waterbirds, trends based on annual surveys by B. Williams et al., supported by the Virginia Coast Reserve. For shorebirds, trends based on Williams et al. counts and special plover surveys. For waterfowl, data from state and federal winter waterfowl surveys. For raptors, migration station data from B. Williams. For songbirds, information from Terwilliger (1991) and unpublished records from Virginia Society of Ornithology. Symbols: n - insufficient information; i - increasing; s - stable; d - some decrease; dd - marked decrease.

Bird Group	Species	Status[a]	Trend[b]
Colonial Waterbirds			
	Brown Pelican	S-SC	i
	Double-cr. Cormorant	NA	i
	Great Blk-bk. Gull	NA	i
	Herring Gull	NA	i
	Black Skimmer	S-SC	dd
	Common Tern	NA	dd
	Gull-billed Tern	S-T	dd
	Least Tern	S-T	d
	Forster's Tern	S-SC	n
	Tricolored Heron	S-SC	d
	Little Blue Heron	S-SC	d
	Black-cr. Night-Heron	NA	dd
	Glossy Ibis	S-SC	s/d
Shorebirds			
	Piping Plover	F-T	s
	Wilson's Plover	S-E	s
	American Oyster-catcher	NA	d
	American Woodcock	NA	dd

Bird Group	Species	Status[a]	Trend[b]
Waterfowl			
	American Black Duck	F-O	d
	Canada Goose (res.)	NA	i
	Canada Goose (migr.)	NA	dd
	Atlantic Brant	NA	s
Marine birds			
	Common Loon	F-O	n
Raptors			
	Peregrine Falcon	F-T	i
	Sharp-shinned Hawk	NA	d
	No. Harrier	S-E	n
	Short-eared Owl	NA	d/n
	Barn Owl	S-SC	d
	Bald Eagle	S-E	i
	Saw-Whet Owl	NA	d
Songbirds			
	Sedge Wren	S-E	n
	Brown-hd. Nuthatch	NA	dd

THREATS TO THE AVIAN COMMUNITIES

An assessment of the threats to which an ecosystem is subjected is a key element of a conservation action plan. Without such an assessment, conservation actions meant to attenuate the threats cannot be effectively planned and implemented. While many initiatives by several organizations and agencies have made substantial progress toward protecting the barrier island system, the avian communities continue to face many threats (See Table 2 on page 13).

Threats can be separated into stresses, sources, and effects. A **stress** is defined as a process or event with detrimental ecological or physiological effects on the element in question (the avian communities of the barrier islands system, in this case). A **source** of stress is the agent, activity, or condition from which the stress is derived. The **effect** of a stress is the result of the stress acting upon the element in question. For example, if a stress on the avian communities is predation, the source would be the predators (gulls, raccoons, etc.) and the effects are death of individual birds and reproductive failure.

Distinguishing stresses, sources, and effects from each other can be challenging; the three concepts are arguably interchangeable in certain cases. Sources may also be hierarchical. For example, the proximate cause of predation may be gulls, but the ultimate cause may be an abundance of anthropogenic food sources (landfills, etc.) which cause an increase in gull populations.

Six categories of stresses are acting on the avian communities of the barrier island system:

* habitat degradation and loss,
* severe weather events,
* competition,
* predation, disease, and contamination,
* disturbance, and
* water quality decline.

Habitat degradation is a decrease in the quality of habitat utilized by the avian communities. Each group of birds has specific habitat requirements, which can be affected by different sources. Several groups utilize different habitats for different purposes. For example, shorebirds may use the interdunal habitats for nesting and the beach for foraging. **Habitat loss** is conversion of habitat needed by the birds into a different habitat by natural succession, invasive plant species, or people.

Severe weather events can "wash out" or otherwise destroy ground nesting (or close-to-ground nesting) birds; flood tides, storm tides, high winds, and heavy rains frequently inundate and destroy nests. These stresses are also related to habitat degradation and to competition as some bird species are being forced to utilize areas that are lower in elevation than their optimal nesting habitat.

Competition refers to competition for resources (food, nesting space, etc.) among bird species. Displacement is often a result of competition among birds, such as gulls displacing terns from their nesting habitats. Competition may also result in depressed food supplies for sensitive species.

Predation includes not only death of mature individuals by predators, but also predation on eggs and young. Many predators of the barrier islands system's birds have increased in recent years. **Disease** includes episodic and chronic outbreaks which can kill off large numbers of birds. Avian cholera is an example. Certain environmental **contaminants**, such as persistent pesticides, can accumulate in birds and cause physiological problems, such as reproductive system damage. Direct damage to birds from oil spills or other chemical sources also fall under this category.

Any interruption of birds' normal activities, such as nesting, foraging, and resting, constitutes **disturbance**. Disturbance of foraging or resting birds may interfere with their ability to assimilate enough energy to survive. Additionally, disturbance of nesting birds frequently results in death of

the eggs or young from exposure. Such nesting disturbance can be a catastrophic event to a colony of nesting birds where all the nests are exposed to the same disturbance at the same time. Death of individual birds from sources such as egging or illegal hunting also falls under this category.

Water quality decline includes water pollution problems such as sedimentation, eutrophication, salt water intrusion, and organic and inorganic toxin contamination. Water quality problems may affect the birds in a variety of ways. Individuals may be killed or made sick by contaminants, food supplies may decline, and habitat may be degraded.

Each of the above stresses is presented in a stress assessment table (Table 2) along with the sources of the stress, the effects of the stress, and the groups of birds affected by the stress. To eliminate or reduce the stresses, conservation actions must focus on eliminating or reducing the sources of the stresses. In some situations, land managers cannot affect all of the sources.

Several stresses face the avian communities of the barrier islands outside of the Virginia barrier islands system. Few of the bird species of concern spend their entire life cycles on the barrier islands. Most nest on the islands, migrate through the islands, or spend the winter months on the islands, but complete other aspects of their life cycles elsewhere, for example, South America. Although they do not have their sources in the barrier islands system, these "off-site" stresses do affect the bird populations that utilize the islands. Since local land managers can do little in the barrier islands to abate off-site stresses, they are not included on the stress assessment table. Regional and hemispheric programmatic- and policy-oriented conservation actions could address off-site stresses.

Table 2.

STRESS ASSESSMENT TABLE FOR VIRGINIA BARRIER ISLAND AVIAN COMMUNITIES

STRESS	SOURCE(S)	EFFECT (S)	BIRD GROUPS AFFECTED
HABITAT LOSS/ DEGRADATION	development -residential and commercial -industrial -roads physiographic changes -shoreline stabilization -island migration -storms, sea level rise dredging invasive species - common reed - pine bark beetle -herbivores(deer,geese,etc.) natural succession forest management	decreased habitat availability reduced population viability abandonment of site	colonial waterbirds shorebirds waterfowl raptors marsh birds songbirds marine birds
SEVERE WEATHER EVENTS	flood tides storms - high winds - large waves - heavy rains	nest inundation reproductive failure	colonial waterbirds shorebirds waterfowl marsh birds
COMPETITION	aggressive species - gulls - cowbirds - mallards - mute swans - cormorants	displacement from optimal habitat decreased habitat availability decreased population viability	colonial waterbirds shorebirds waterfowl songbirds raptors marine birds
PREDATION, DISEASE, AND CONTAMINATION	birds - gulls, crows, grackles, etc. mammals - raccoons, foxes, rats, etc. crustaceans - ghost crabs pathogens and parasites - avian cholera, etc. contaminants - agricultural chemicals - petroleum products - industrial chemicals	death of individuals reproductive failure decreased population viability	colonial waterbirds shorebirds waterfowl songbirds raptors marine birds marsh birds
DISTURBANCE	recreational activities - walking, picnicking, etc. - hunting, fishing, etc. - boating, jet skis, etc. - ORV's - pets commercial/industrial use - ecotourism - fishing, aquaculture - industry, military, dredging research activities illegal activities - hunting - egging	interference with individuals' nesting, foraging, and resting behavior reproductive failure decreased population viability abandonment of site death of individuals	colonial waterbirds shorebirds waterfowl marsh birds raptors marine b

WATER QUALITY DECLINE includes: sedimentation, eutrophication, salt water intrusion, organic and inorganic toxins	agriculture residential/commercial industry roads forest management boats	various ailments decrease/damage in food supply decreased population viability reproductive failure habitat degradation	colonial waterbirds shorebirds waterfowl marsh birds marine birds raptors

RECOMMENDED ACTIONS

The Virginia Barrier Island Avian Partnership recognizes that a Conservation Action Plan to address the numerous threats to the avian community in the Virginia barrier islands is needed in order to ensure the long-term viability of the avian community.

The Conservation Action Plan should include specific, achievable, and measurable actions in the areas of management, research and monitoring, and education that help reach the goal of long-term viability of the avian community. The Virginia Barrier Island Avian Partnership has agreed to meet at least bi-annually on an on-going basis (spring and fall) to evaluate the progress of each recommended action toward reaching the goal of long-term viability of the avian community.

These actions can be initiated by individual organizations and agencies, or can be coordinated efforts among partners. Multiple strategies and cooperative approaches often are needed to address threats. Research and monitoring are necessary for designing the most effective management strategy for some of the suggested actions below. Finally, education and information exchange among managing organizations and agencies, as well as within the larger community, is critical to achieve the goal of long-term sustainability of the avian communities, species, and habitats.

The Partnership team acknowledged that while many strategies are needed to address threats to the avian community of the Virginia barrier islands, actions must be prioritized to move forward and secure necessary funding to conduct these efforts, beginning with those actions that address the most urgent threats. Accordingly, criteria were determined for highlighting action priorities:

A) Action benefits species of greatest concern.
B) Action is feasible (financially, physically).
C) Action's benefit is significant relative to the cost (high benefit/cost ratio).
D) Action is measurable in terms of its impact and level of success.
E) Action has a catalytic effect.
F) Action fosters partnerships.

To reach the goal of long-term viability of the avian communities, species and habitats in the Virginia barrier islands, the Barrier Island Avian Partnership team offers the following recommendations in the areas of management, research and monitoring, and education for conservation action.

Management Actions

1) *Posting and seasonal closure of critical nesting habitat for species of concern, including colonial waterbirds and shorebirds.*

Most agencies and landowners already have programs in place to post signs designating critical nesting areas for species of concern on the beaches of the barrier islands. The overall effectiveness of posting such signs could be improved by a coordinated approach utilizing consistent signage throughout the region, and by extending this posting program to include critical nesting areas in the State-owned marshes and meadowlands. This action addresses the threat of human disturbance.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: VA Marine Resources Commission, U.S. Fish & Wildlife Service, The Nature Conservancy, VA Department of Conservation & Recreation.

Tasks: To assess on-going posting programs, identify gaps in coverage, and design and implement comprehensive and coordinated posting program.

2) *Support and supplement current policies and programs that prevent further degradation and loss of habitat.*

Many initiatives are already underway to help prevent further habitat degradation and loss in the Virginia barrier islands system. Habitat degradation and loss can be minimized through enforcement of some policies already in place, as well as establishment of new policies. Suggestions for action from the Partnership team include:

A) Enforcement of the Barrier Island Policy, the Primary Sand Dune Act, the Wetlands Act, and the Code of Virginia relating to submerged lands, all of which are administered by VMRC.
B) Enforcement of The Chesapeake Bay Preservation Act for the seaside of Northampton County.
C) Development of specific efforts to protect water quality including designation of "Special or Exceptional Waters" and "No Discharge Zones."
D) Curtailment or banning of offshore dumping by ships.
E) Development of a coordinated oil spill response plan.
F) Establishment and protection of buffer zones on the mainland through local zoning

and other methods.

G) Protection of critical inholdings through acquisition and easements.

H) Promotion of consideration of the avian community in the development of local, State and Federal plans including the Marshes and Meadowlands Management Plan, State fisheries plans, the Waterway On the Coast of Virginia, the National Wildlife Refuge Administration Act on wildlife refuges, and the Special Area Management Plan for Northampton County.

Lead Partner: All partners.

Tasks: To identify causes of on-going habitat loss and degradation and to remedy such losses or degradation through programmatic means, and to work with land protection efforts (Federal, state, and private) to protect critical habitats through acquisition and easements.

3) *Continuation of existing active management, recovery, and restoration plans for nesting Piping and Wilson's Plovers, nesting and wintering Black Ducks, and Peregrine Falcons.*

A special effort under the North American Waterfowl Management Plan (NAWMP) and the Black Duck Joint Venture, involving multiple public and private entities in a comprehensive program, has been established to address the concern over the decline of the Black Duck in the Atlantic flyway. The Virginia barrier islands system is one of the most important areas in Virginia for Black Ducks. NAWMP focuses on recovery of waterfowl through habitat restoration, enhancement and acquisition.

The Piping Plover is listed as threatened on the Atlantic coast. Its population in Virginia is relatively stable in part because of intense local management efforts coordinated under a coast-wise recovery plan by the USFWS. The Wilson's Plover is a threatened species in Virginia and subjected to a State recovery plan.

The Peregrine Falcon has been successfully re-introduced to the Virginia barrier islands system through an active program of captive breeding and "hacking" of immature falcons in elevated nest boxes.

These various actions address multiple threats, including habitat loss and degradation, predation, and storms and flooding.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: U.S. Fish & Wildlife Service, The Nature Conservancy, VA Department of Conservation & Recreation, Center for Conservation Biology, National Biological Service, VA Marine Resources Commission.

Tasks: Assessment and continuation of on-going management, restoration, and recovery plans for high priority species.

4) Implementation of selective predator control measures for avian and mammalian predators.

Documentation of the types and sources of predation on sensitive bird species in the Virginia barrier islands system is needed to support control programs for both avian and mammalian predators. Avian predators on the avian communities include Herring Gulls, Great Black-backed Gulls, Fish Crows, Northern Harriers, and Common and Boat-tailed Grackles. Mammalian predators on the avian communities include foxes, raccoons, and rats. Although the Barrier Island Avian Partnership recognizes that avian and mammalian predation is, in fact, a substantial threat, pursuing this approach as a viable option would require a coordinated and cooperative program of action.

All predator control programs and approaches place big demands on staff and resources to carry out the actual logistics of control or removal. This action is further hampered by a lack of data for confirming the extent of the impact of each of these predators and a need to identify the most appropriate sites, secure the right permits, and determine the best and most effective approach to quell their impact. Opposition to predator control programs also has to be assessed.

Mammalian predator control options include removal, barriers, and exclosures. Predator removal would involve trapping or culling of mammalian predators in a specific area where species of concern have been shown to be impacted by predation. Physical or other means of establishing barriers between mammalian predators and bird nesting areas is another option. Initial efforts to use exclosures of varying sizes and types to protect nesting Piping Plovers has proven challenging. Research is needed on varying sizes and structures of exclosures and their relative effectiveness in separating mammalian predators from the bird communities.

Creation of predator-free nesting areas using dredge spoil is another option that has proven successful in North Carolina. Challenges to this approach in the Virginia barrier island system include identification of nearby sources for shell or other suitable materials to create these predator-free islands, and logistical and staff demands for executing this approach.

A substantial threat to the avian community from avian predators involves Herring and Great Black-back gull populations in the Virginia barrier island system. The threat from gulls is three-fold: predation, competition, and displacement. Thus most management actions would be directed toward these two gull species. Options for management action include selective culling of gulls at specific sites known to have problems with significant gull predation, competition, or displacement of other species of concern from critical habitat. Construction of physical barriers, such as monofilament grids, should be evaluated for effectiveness in reducing all types of avian predators. Sanitary landfill management, i.e. the immediate burial of fresh refuse, would decrease the attractiveness of landfills as a source of food for gulls.

Lead Partner: U.S. Fish & Wildlife Service.

Co-Partners: VA Department of Game & Inland Fisheries, VA Department of Conservation & Recreation, The Nature Conservancy, VA Marine Resources Commission.

Tasks: Research to further assess and document impacts of predators on avian species and implementation of predator control programs on selective islands and marshes.

5) Development of guidelines for conducting scientific research, military maneuvers, and channel dredging activity.

Many landowners already have permit systems in place for scientific research on their lands. The strategy for this action would be to extend the permit system to areas where it presently does not exist, i.e., the State-owned marsh and meadowlands; develop consistent protocols to the degree possible; and educate and encourage researchers to minimize their impacts on the birds, particularly when the birds are nesting.

Currently, different landowners take different approaches concerning military operations on their properties. Some landowners completely prohibit military operations on their properties, while others allow training operations. In light of the extraordinary ecological values of the Virginia barrier islands system, the Partnership team recommends that the system be designated off-limits to active military exercises. If military operations are to continue in this area, the following actions should be considered: 1) protocols should be established and followed for asking permission and respecting property; 2) conditions of use of property, often essential to protect avian species of concern, should be observed; and, 3) lines of communication with the U.S. Army at Forts Story and Eustis and the U.S. Navy at Little Creek regarding their plans for maneuvers should be established.

The Army Corp of Engineers should be encouraged to set time of year restrictions during the bird nesting season (mid-March through mid-September) for dredging activities in the Virginia barrier island system. Since most survey benchmarks are located on topographical highs which also host nesting birds, the seasonal restrictions should also be extended to surveying activities associated with dredging projects.

Lead Partner: VA Department of Game & Inland Fisheries

Co-Partners: VA Marine Resources Commission, U.S. Fish & Wildlife Service, The Nature Conservancy, VA Department of Conservation & Recreation

Tasks: Develop draft policy incorporating the different approaches of the respective landowners to military operations on their properties for discussion with the military, and monitor the development of the management plan for State-owned marsh and meadowlands with respect to use by scientific researchers, the military, and for dredging and surveying activity.

6) Creation and augmentation of nesting and foraging habitat.

Intertidal foraging areas (mudflats) could readily be created using the fine, silty dredge spoil available throughout the barrier islands system. Inlet beaches could be augmented with sand, if available from adjacent inlet dredging. Shrub thickets and other native vegetation could be planted on diked spoil areas that are no longer used for deposition of spoil. Shellpiles utilized for nesting in the area could be augmented with more shells or other suitable material to raise their elevations.

The challenges of creating new habitat or augmenting existing habitat where appropriate include establishing a method that works; the availability of nearby appropriate material (dredge spoils or other materials), and; determining the most effective elevations. Thus, an experimental approach is advocated. This action offers several advantages, including creating a solution that addresses several threats, such as predation, habitat loss, and storms and flooding; the opportunity for a partnership approach to address a problem; and the potential of using materials created by other practices in the area, such as channel dredging, for beneficial purposes. Potential impacts to other species and natural communities must be weighed when considering creation of new habitat.

Lead Partner: National Biological Service.

Co-Partners: U.S. Fish & Wildlife Service, VA Department of Game & Inland Fisheries, The Nature Conservancy, VA Marine Resources Commission, Center for Conservation Biology.

Tasks: Design and implementation of small scale pilot projects to test the feasibility and practicality of the creation and augmentation of nesting habitat.

7) Development of a cooperative plan for the control of Phragmites.

Efforts to control the invasion of the Common Reed Phragmites should be undertaken only to achieve specific goals and under the guidance of a cooperative plan. At this time, an experimental demonstration control and monitoring program is being undertaken by several members of the Partnership team. The goal of this control program is maintenance of waterfowl habitat in the interiors of the islands and on the southern tip of the Eastern shore. This program could be expanded throughout the Virginia barrier islands system and tied in to future efforts directed toward restoration of former dredge spoil sites on the mainland.

Co-Lead Partners: U.S. Fish & Wildlife Service and The Nature Conservancy.

Tasks: Continuation of the experimental demonstration control and monitoring program and assessment of the potential for further control efforts of Phragmites on the mainalnd under the restoration component of the future ACOE's "Water Resources Study of the Eastern Shore".

8) Evaluation and development of a training and certification program for nature tour operators on State lands.

Operators of nature tours on State lands in the Virginia barrier islands system could be encouraged to take a training course in understanding the ecosystem and the avian community and how to operate in a low-impact manner. A voluntary training and certification program could be developed, with visitors encouraged to use only certified operators.

At present, the VA Department of Environmental Quality has funded the development of a potential training curriculum for heritage tour operators on the Eastern Shore and has also funded research on State Corporation Commission license requirements and the requirements, legal and otherwise, of other tourism programs. The Nature Conservancy is also developing and implementing a business plan for creating tourism business ventures involving a high-quality, low-environmental impact "Eastern Shore Experiences" program for its lands under the auspices of the Northampton Economic Forum. The U.S. Fish & Wildlife Service presently has a training and monitoring program for concessionaires on its lands.

Evaluation of the need for and determination of who or what agency (State or local) would design the training workshops, administer and fund the program, conduct the training, and issue the certifications is needed.

Co-Lead Partners: The Nature Conservancy and VA Department of Conservation & Recreation..

Co-Partners: VA Department of Game & Inland Fisheries, VA Marine Resources Commission, U.S. Fish & Wildlife Service.

Tasks: Assessment of on-going initiatives and development of a proto-type training and certification program for nature tour operators on State lands, and determination of what agency (State or local) would administrate and fund the program.

Research and Monitoring Actions

Research and monitoring are essential for understanding the avian communities of the barrier islands system and the impact of various factors on these communities. Because research and collection of data are so fundamental to addressing threats and for designing the most effective management strategies, the Barrier Island Avian Partnership recommends the following research actions:

*** High Priority Actions ***

1) *Assessment and continuation of current long-term monitoring programs to collect additional data on trends for colonial waterbirds, Piping and Wilson's Plovers, American Black Duck/waterfowl, fall passerines and raptors, wintering woodcock, and migrating shorebirds.*

Monitoring programs for some species have been in place for ten years or more. For other species or species groups, monitoring programs have only recently begun. Accurate information on population status will be necessary for those species or groups where management goals are set, and progress evaluated. Funding should be secured to assess and analyze long-term data sets, identify information gaps, and continue high-priority monitoring programs.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: U.S. Fish & Wildlife Service, The Nature Conservancy, Center for Conservation Biology, VA Department of Conservation & Recreation, National Biological Service, VA Marine Resources Commission, Kestrel.

Tasks: Assessment of on-going monitoring and data sets, identification of gaps, and initiation of monitoring for high priority species.

2) *Research (pilot projects) that evaluate the productivity of priority species, such as Piping Plovers, Gull-billed Terns, Black Skimmers, etc.*

Repeated ground surveys are necessary to determine reproductive success for species when population declines are indicated by annual surveys. These census will provide detailed information regarding species associations, nest site characteristics, causes of losses to productivity and other factors of biological and ecological interest. Highest priority should be given to species likely to become endangered or threatened and to those species presently listed.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: National Biological Service, U.S. Fish & Wildlife Service, The Nature Conservancy, Center for Conservation Biology, VA Department of Conservation & Recreation.

Tasks: Continuation of productivity studies for Piping Plovers and Gull-billed terns, design and initiation of productivity studies for Black Skimmers.

3) *Analysis of landscape changes, sea level rise, and spatial and temporal patterns of nesting birds utilizing the existing twenty-one year database on nesting colonial birds.*

These data provide the opportunity to investigate the consequences of changes in the structure and distribution of nesting habitat associated with a broad range of environmental forces. Efforts should be taken to analyze these long-term data sets to determine the ecological parameters that contribute most to changes in species diversity, richness, and distribution within the barrier islands system. Information gathered from this project could allow predictions regarding habitat and population stability, which would be of enormous value to long-term management.

Lead Partner: The Nature Conservancy.

Co-Partners: VCR Long Term Ecological Research Project, Center for Conservation Biology, National Biological Service, VA Department of Game & Inland Fisheries.

Tasks: Creation of electronic databases and GIS and design of ecosystem research project to analyze landscape patterns, colony site locations, and ecosystem processes.

4) *Research (pilot project) to document and control crustacean, avian, and mammalian predation - exclosures, barriers, selective culling, and removal.*

Predation is often cited as a severe limiting factor in studies of nesting success for ground nesting birds in the barrier islands system. Many predator populations benefit from human presence. Both lethal and non-lethal methods of predator control are available and can be effective. Which methods, if any, should be applied should depend on the severity of the problem and on the environmental and biological factors driving the predator/prey relationship. Further consideration must be given to the logistical and economical feasibility of the treatment.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: U.S. Fish & Wildlife Service, The Nature Conservancy, National Biological Service, Center for Conservation Biology, VA Department of Conservation & Recreation.

Tasks: Design and implementation of research projects to document predation on avian resources, design and implementation of programs to control predation on avian resouces.

5) *Research (pilot projects) on the creation and augmentation of nesting habitats (inlet beaches, shell piles, and other upland areas) and intertidal foraging areas (mudflats) using dredge spoil and other suitable materials.*

Dredge material islands could provide alternative nesting sites safe from mammalian predators and are less vulnerable to tidal flooding than many natural sites. Those species with habitat preferences for substrates composed of sand mixed with shell could be encouraged to nest on man-made dredge material islands. Dredge materials might also be used to supplement inlet beaches and to create intertidal flats as effective foraging areas for shorebirds. Preliminary research is needed to identify where dredging occurs, what substrates are available, and whether dredge spoils are suitable for the creation of foraging and nesting habitats for birds. Monitoring of such sites would be required to determine their success and the effects of vegetation succession on species diversity over time.

Lead Partner: National Biological Service.

Co-Partners: The Nature Conservancy, VA Department of Game & Inland Fisheries, VCR Long Term Ecological Research Project, VA Marine Resources Commission, U.S. Fish & Wildlife Service.

Tasks: Design and implementation of small scale pilot projects to test the feasibility and practicality of the creation, augmentation, and enhancement of nesting habitat.

6) Establishment of guidelines for data collection, ownership, access, and archive.

Proper management of data is essential for protection of specific locational information and for dissemination of information to the appropriate land managers, land owners, and to the research community. Raw data should be archived at one primary data storage facility for long-term stability and security. Data ownership and formal data ownership rights should be designated prior to data collection with a preset statute of limitations before joint ownership occurs. Steps should be taken to make data readily available to those who need it but to also protect the ownership and publication rights of those who collect it. These goals can only be met through adherence to data agreements made prior to initiation of research projects.

Lead Partner: VCR Long Term Ecological Research Project.

Co-Partners: Center for Conservation Biology, VA Department of Game & Inland Fisheries, The Nature Conservancy, VA Department of Conservation & Recreation.

Tasks: Design and implementation of a program of guidelines for data collection, ownership, access, and archive.

*** Medium Priority Actions ***
To be pursued if additional funding sources are identified.

7) *Research (pilot project) to document and evaluate effects of newly arriving species, e.g., Herring Gulls, Black-backed Gulls, Mute Swans, Brown Pelicans, and Cormorants, on long-term resident species.*

Newly arriving species can influence the abundance and distribution of other resident birds directly by predation and competition or by usurping available nesting habitat. Field studies should be designed to document and evaluate the consequences of interactions and make recommendations for management of newly arriving species.

The Partnership team specifically recommends a pilot project involving Herring and Black-backed Gulls and an evaluation of their impacts on other avian species. This pilot project could be the precursor to a gull management program in specific problem areas with substantial gull competition, predation, and displacement.

Brown Pelicans, Double-crested Cormorants, and Mute Swans are three species that have colonized the barrier islands system in recent years. The effects of their additional demands on the system's resources and their interactions with long-term resident species should be investigated.

Tasks: Conduct literature searches for information on the impacts of newly arriving species on long-term resident species and for information on other control efforts, implement research to document impacts in Virginia.

8) *Initiation of status surveys and baseline monitoring of rails, songbirds, marine birds, and raptors in the barrier islands system.*

Five species of rails occur within the marshes of the barrier island system. Little information is available regarding their population status and distribution or in some cases their basic biology. Development of a practical census method for rails is needed.

Habitat availability for nesting and migrating songbirds, raptors, and shorebirds on the barrier islands has not been investigated. Further, land use patterns on the barrier islands have changed dramatically in the last century. Baseline data on songbird nesting density, biology, and habitat requirements are needed to insure their effective conservation.

The use of the barrier islands system and the continental shelf waters offshore by migrating and wintering marine birds has not been investigated. Surveys of the seasonal distribution of marine birds in the system should be initiated to provide baseline population data for establishment of future management requirements.

The National Biological Service has recently initiated surveys on marsh birds, including rails and bitterns. Research in the barrier island system on population trends of wintering raptors, including Red-tailed, Sharp-shinned, Cooper's Hawks, Merlins, and Northern Harriers, and on wintering waterfowl, is also needed.

Tasks: To develop cooperative relationship with Partners In Flight program and the development of their inventories and monitoring programs.

9) Research to establish trophic linkages among specific prey species and the avian species that depend on them; a bioindicator framework.

Assessing how avian species depend upon specific prey types, and determining the ecological sensitivity of these prey to changes, would enable researchers to evaluate the usefulness of certain avian species as "bioindicators" of estuarine change. The focus of such research should be on key species such as horseshoe crabs, fiddler crabs, anchovies, killifish, menhaden, and silversides.

Tasks: Design and implementation of research to establish trophic linkages among prey species and the avian species that depend on them.

10) Research on linkages between terrestrial and estuarine systems: nutrients and contaminants.

A number of avian species depend on both terrestrial and estuarine systems, including Laughing Gulls, Gull-billed and Forster's Terns, and many shorebirds. Black Ducks nesting in coastal marshes could also be another appropriate species to investigate as to the distribution of chemical contaminants throughout the barrier islands system. The transfer of contaminants (pesticides and herbicides) from terrestrial systems into the barrier island lagoons and marshes and their effects on productivity of nesting birds have not been studied.

Tasks: Design and implement research on the linkages between terrestrial and estuarine systems.

11) Basic research on the ecology of Phragmites and its utilization as habitat by birds.

Vegetation structure is an important determinant in colony site selection for colonial waterbirds and in nesting habitat for waterfowl. Formerly suitable sites may be rendered unavailable as nesting habitat for colonial waterbirds and waterfowl by the invasion of Phragmites. Research should be undertaken to map Phragmites occurrence and determine the extent to which nesting habitat is declining as a result of Phragmites. Research should also address the degree to which Phragmites is beneficial as cover or roosting habitat to other species during migration. Finally, research is needed on the basic ecology of Phragmites to determine the mode of its invasion.

Co-Lead Partners: U.S. Fish & Wildlife Service, The Nature Conservancy, and the Va Department of Conservation & Recreation.

Task: Conduct literature searches on Phragmites and compile a bibliography (DCR).

Task: Map relative distribution of Phragmites on the seaside (TNC and USF&WS).

12) Monitoring of the potential interactions between the developing aquaculture industry and birds.

Shellfish aquaculture is a growing industry in the barrier islands system which requires natural bottomlands and may in some cases result in disruptions to breeding or foraging birds from increased human presence. In other areas, conflicts between finfish aquaculture and foraging birds have resulted in illegal control efforts. The impacts of aquaculture activities should be monitored and evaluated for the need of guidelines to allow their operation to proceed with a minimum of disturbance to birdlife.

Tasks: The Partners agreed to continue to passively monitor the developing aquaculture industry for impacts to avian species.

In order to conduct the necessary and critical research recommended above, funding is essential. The Partnership team recommends that the agencies, organizations and individuals involved in the development of this Conservation Action Plan work cooperatively in an ongoing "partnership" approach to secure the funding necessary to conduct this research.

Conservation Education

The goals identified by the Barrier Island Avian Partnership for conservation education programs include:

* Increasing the understanding of and creating an appreciation for the area and all its avian communities, species and habitats. This activity includes explaining what is known and what is not known about the ecosystems.

* Explaining what activities are harmful or have a negative impact on the avian communities, and why.

* Encouraging the adoption and implementation of the Conservation Action Plan to ensure the long-term sustainability of the avian communities.

* General environmental education.

Educational efforts can include a broad spectrum of activities and tools, such as community workshops, volunteer projects, cooperative signage, videos, interns, and training programs. User groups, such as Virginia Ornithological Society and KESTREL, and on-going activities, such as the Birding Festival, Project Wild, Northampton Legacy, WHRO Bay Link program, etc., could be utilized to promote educational and informational activities.

Educational efforts should be directed to the following audiences:

1) Recreational users of the barrier islands/salt marshes
2) Local students and teachers
3) Local, State, and Federal governments/agencies
4) Scientific researchers
(5) Nature tour operators
(6) Business and industry
(7) Resource management staff

Conservation Education Actions

1) Development of signage highlighting the fragility of the barrier island avian communities to be posted at boat ramps and other public access points.

The Barrier Island Avian Partnership believes that a cooperatively developed poster or sign highlighting the fragility of the barrier island avian communities, especially during the nesting season, is needed. This sign will be posted at area boat ramps and other access points and distributed to local schools and businesses. This sign, incorporating a code of ethics (see Appendix II), could also promote other ways for visitors to avoid impacts to the birds on the islands and marshes, as well as alert visitors to posted and closed areas, access guidelines, and other illegal activities. Funding for this signage is available from the Virginia Coastal Resources Management program.

Lead Partner: VA Dept. Game & Inland Fisheries.

Partners: U.S. Fish & Wildlife Service, The Nature Conservancy, Va Dept. Of Conservation & Recreation, Va Marine Resources Commission.

Task: Development of sign or poster highlighting fragility of the barrier island avian communities, especially nesting birds on the beaches, islands and marshes.

2) Development and implementation of local conservation education programs for local Eastern Shore students and teachers and for the Eastern Shore community at large.

Local conservation education programs for teachers, students and residents can include such outreach activities as videos and slide programs, intern programs, cultural history programs, workshops associated with a curriculum for the classroom, Legacy and Project Wild programs, WHRO Bay Link program, etc. Educational information on the birds and their habitats and sensitivities could be incorporated into local curricula to meet the new Virginia Science Standards of Learning (SOL's) as well as into an home page on the Internet for the Avian Partnership with information on the birds of the region. This home page could also be linked with the home pages being developed by other individual partners, such as DCR, LTER, etc.. Lessons gained from on-site workshops, research projects, classes, and internships would increase the understanding and, therefore, appreciation of the system.

It is anticipated that development of a local conservation education program through an intern program headed by KESTREL will require two years at a minimum of $30K per year. KESTREL will also need another agency to administer the grant and employment of the intern and provide office space and support. Funding for an incentive program for teachers' participation is also needed. Partial funding for the development of an intern/conservation education program is available from the Virginia Coastal Resources Management program.

Lead Partner: KESTREL

Co-Partners: Create a Barrier Island Avian Partnership "Education Sub-Committee" to pursue with KESTREL the development, funding, and implementation of local conservation education programs. Potential members of this sub-committee should include representatives of KESTREL, The Nature Conservancy, Va. Department of Game & Inland Fisheries, Va. Department of Conservation & Recreation, U.S. Fish & Wildlife Service, Kiptopeke State Park, the Virginia Coastal Resources Management program, and local governments and schools.

Tasks: Seek funds for a KESTREL intern to develop and implement an avian conservation education program and activities for local students and teachers and the Eastern Shore community at large, and to develop a home page on the Internet for the Avian Partnership

3) Work proactively with sustainable industrial, business, and ecotourism development initiatives on the Eastern Shore to promote and protect its natural resources, habitats, and the avian communities that depend on them.

Local sustainable development initiatives that protect and capitalize on the region's world-class natural, cultural, historic and human assets for the on-going benefit of all citizens should be encouraged. Northampton County is starting to become a national model of sustainable development with its proposed Port of Cape Charles Sustainable Technologies Industrial Park, the Eastern Shore Birding Festival, the Northampton Economic Forum, and other local initiatives. Strategies to work proactively and collaboratively on ensuring reduced impacts to the avian communities from any industrial and commercial development include building communication, sharing information about the impacts of development and land use changes on the avian communities, and encouraging local, State and Federal governments and agencies to consider the avian communities in their zoning, land use, and economic development plans.

Training workshops could be used as part of a volunteer certification program for nature tour operators. Training would include bird identification, recognition of nesting behaviors, recognition of nesting habitat, knowledge of traditional colony sites and current posted areas, suggested minimum approach distances, interpretation of the natural history of birds in the barrier islands system, and other subjects to improve educational benefits of the tours and prevent unnecessary disturbance to birds. A curricula for a voluntary certification program for nature tour operators has already been developed by Sarah Mabey for the Virginia Coastal Resources Management program.

Lead Partner: All Partners.

Tasks: In order to work proactively within the local Eastern Shore community in the development and promotion of sustainable development initiatives, including businesses and ecotourism, to ensure that such initiatives include the welfare of the avian communities, three sub-tasks have been formulated: (1) Extend an invitation to the Chambers of Commerce and other sustainable development initiatives on the Eastern Shore to join the Avian Partnership. (2) Work with the Virginia Coastal Resources Management program on the implementation of a voluntary certification program for nature tour operators. (3) Work with the U.S. Fish & Wildlife Service, the Virginia Department of Conservation & Recreation, and other local and regional efforts to identify lands that, because of their extraordinary biological value, need protection.

4) Development of a notice highlighting the sensitivities of the barrier island avian communities, especially nesting birds and their critical habitats, targeted at researchers and local resource staffs.

Researchers conducting their work in the barrier islands system during bird nesting season must be advised of the locations of bird colonies within their research area and cautioned about the sensitive nature of those colonies. Taking the necessary steps to avoid negative impacts to

nesting birds should be a prerequisite to the granting of research permits.

Staff of the various public and private resource management agencies and organizations in the Virginia barrier islands system, particularly those personnel not associated with the research and management of avian communities, should be educated as to the sensitive nature of the avian communities and their needs. Such staff often interact with the general public on a more regular basis than researchers and managers and can thus provide critical public education.

This notice or brochure, targeted at researchers, resource managers, and others who frequent the barrier island system, would highlight the sensitivities of the avian communities to disturbance. It could also be used as an educational tool for local citizens, resource management committees, and other community groups.

Lead Partner: VA Department of Game & Inland Fisheries.

Co-Partners: VA Department of Conservation & Recreation, The Nature Conservancy, the VA Marine Resources Commission, the VCR/LTER, and the U.S. Fish & Wildlife Service.

Task: Fund and develop a notice on the sensitivities of the avian communities, especially nesting birds and their critical habitats, for researchers and local resource management staff.

5) Development of a set of guidelines for public access to beaches, islands, and marshes.

The development of a set of guidelines for public access to islands, beaches, and marshes in the Virginia barrier island system could be used to educate visitors to sensitive elements, including birds, and for coordination among the different landowners. The basic content of the guidelines would include the following: (1) Direction of the public toward local areas already open and set up to handle the public, including Kiptopeke State Park, the Visitor's Center at the Eastern Shore of Virginia NWR, etc. (2) Each property owner has their own access guidelines and concerns for visitor impacts, spelled out for each property, and (3) the unassigned state-owned public lands and waters are open to traditional uses provided natural values and processes are not impacted. This informal set of guidelines could be patterned after the *Maine Forever* brochure with a similar system of distribution.

Lead Partner: Virginia Coastal Resources Management Program

Co-Partners: All Partners.

Task(s): Assist the VA Coastal Resources Management program in developing a set of guidelines for public access to beaches, islands, and marshes that could be incorporated into an informal MOU among the different agencies/landowners.

Appendix I

Barrier Island Avian Partnership

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Appendix II

General Discussion on a Code of Ethics

The Partnership team thought that the development of a Code of Ethics guiding people's activities while in the Virginia barrier islands system would be beneficial. The target audience would be the public that is or will be living in or visiting the Eastern Shore. Statements would be simple and concise, providing general guidance and explanations of the rational for suggested behaviors. The tone should be positive and firm. Graphics or pictures could help enhance statements or information.

The Partnership team discussed the context in which the Code of Ethics could be included. Specifically outlined was an informational pamphlet or brochure providing a variety of information and emphasizing the Code of Ethics. Ideas concerning content of the brochure included the following:

A) An introduction explaining the significance of the Virginia barrier islands system and its resources.

B) Explanation that different portions of the area are owned by different organizations and agencies and that their respective rules should be observed. For more information on specific islands, refuges, wildlife management areas, or preserves, visitors should contact the respective agency or organization that owns and manages the area (listed in pamphlet).

C) Code of Ethics statements. The challenge in formulating a Code of Ethics will be in defining general statements that do not transcend the specific policies of the diverse landowners.

1. *Leave pets at home.* Pets harass and molest wildlife and can disrupt critical nesting and foraging behavior.
2. *Respect and obey restricted and posted areas.* The signs are there for protective purposes of critical habitat necessary for the well-being of wildlife..
3. *Observe wildlife from a distance.* Close encounters with wildlife can disrupt critical nesting and foraging behavior.
4. *Leave plants where they are found.* Collection of plant specimens can impact the viability of natural communities and species.
5. *"Take only photos, leave only footprints."*
   In other words, appreciate and enjoy the area, but in a low impact manner.
6. *Pack out trash:* fishing lines, picnic supplies, recreational equipment, paper, plastic bags, etc..

D) For further information contact: Virginia Department of Conservation and Recreation (DCR), US Fish and Wildlife Service (USFWS), the Nature Conservancy (TNC), and the Virginia Department of Game and Inland Fisheries (VDGIF).

The overall purpose of the development and distribution of this material is to increase awareness and appreciation of the area, and translate that into careful and respectful use of the Virginia barrier islands system.

Some of the challenges for implementing this approach are the selection of criteria for user areas; developing the specifics of a code of ethics; determining the impact and effectiveness of these approaches; coordinating these efforts among different landowners and the community; and the time, funding and labor required to develop and implement these approaches. A coordinated approach to enforcement would also need to be developed.